Beach Seine Catch Data from Sechelt Inlet and Agamemnon Channel, British Columbia

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by

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ABSTRACT

Levings, C.D., I.K. Birtwell, and G.E. Piercey. 2003. Beach seine catch data from Sechelt Inlet and Agamemnon Channel, British Columbia. Can. Data Rep. Fish. Aquat. Sci. 1110: iii + 23 p.

Data are presented from beach seine surveys in May, June, and July 1987 at Agamemnon Channel and Sechelt Inlet on the east side of the Strait of Georgia. Chum salmon fry dominated catches of salmonids except for one location, where large catches of coho smolts that had escaped from a salmon net pen operation were obtained. Chum fry in Agamemnon Channel were larger relative to those from Sechelt Inlet and were likely fish migrating to sea after a period of growth in the southern Strait. Thirty-seven taxa of fish were caught in the surveys. Habitat observations at each of the sample sites are also given.

RESUMÉ

Levings, C.D., I.K. Birtwell, and G.E. Piercey. 2003. Beach seine catch data from Sechelt Inlet and Agamemnon Channel, British Columbia. Can. Data Rep. Fish. Aquat. Sci. 1110: iii + 23 p.

Les données présentées rendent compte de relevés effectués à la senne de plage en mai, juin et juillet 1987 dans le chenal Agamemnon et dans le bras Sechelt, sur la rive orientale du détroit de Georgia. Les alevins de kétas dominaient les prises de salmonidés, sauf à un endroit, où on a capturé une grande quantité de smolts de cohos échappés d'une salmoniculture. Les alevins de kétas du chenal Agamemnon étaient plus gros que ceux du bras Sechelt, et il s'agissait vraisemblablement de poissons prêts à migrer vers le large après une période de croissance dans le sud du détroit. Nous avons capturé 37 taxons de poissons pendant les relevés. Nous présentons aussi des observations sur l'habitat à chacun des lieux d'échantillonnage.

INTRODUCTION

The migratory routes and rearing habitats of juvenile salmon from the Strait of Georgia and adjacent inlets are poorly known but are important data for habitat managers and coastal planners. In this report we present data from nearshore surveys conducted in two contrasting coastal seaways on the east side of the Strait, an area that has not been investigated by researchers. The work was conducted in May, June, and July 1987.

Agamemnon Channel is an open, northeast tending channel connecting Malaspina Strait with the mouth of Jervis Inlet. This channel affords northward migrating juvenile salmon from the Fraser River (e.g. chum salmon fry, *Oncorhynchus keta)* a route from the estuary to the northern end of the Strait and hence to sea (Levings and Tompkins 1985). Sechlet Inlet, in contrast, is an enclosed fjord with a narrow entrance (Skookchumkuk Narrows, 2 km wide) - only local populations of salmonids are the likely users of the inlet.

Our studies were also stimulated by a concern, at the time, that during their migration and rearing phases juvenile salmon would be preyed upon by farmed fish (coho and chinook, *O. kisutch* and *O. tshawytscha* respectively). In 1986 there were 18 approved salmon farm locations on Sechelt Inlet and seven approved locations on Agamemnon Channel, with numerous other applications pending (Keller and Leslie 1996, p.29). Due to logistics and time constraints, we only made a few observations on this topic; in particular we documented catches of escaped coho salmon from a net pen operation.

METHODS

SAMPLING STATIONS

Stations were selected on the basis of substrate, slope, ease of access and proximity to operating and planned fish farms. Except for a few beaches and mini-deltas at the mouths of creeks, most of the shorelines of the Agamemnon Channel and Sechelt Inlet are steep and rocky, so that beach seining was possible at only a few locations. Table 1 and Figure 1 give descriptions and locations of the sample stations.

SAMPLING PROCEDURES

A 14.7 beach seine, with wings 4.9 m (1 cm stretch mesh), bunt 4.9 m (3 mm mesh), and depth 1.5 m, was used in the sampling, deployed by boat or by wading, depending on water depth at the particular locations. Stations on Sechelt Inlet were sampled in all three months. Agamemnon Channel was only sampled in May and July because weather conditions prevented sampling during the June trip. All fish species were identified, enumerated, and released, except for the June trip to Sechelt Inlet. On

that trip only salmonids were enumerated. During the May trip to Sechelt Inlet, surface temperature and salinity were measured with a Beckman RS-5 inductive salinometer.

Subsamples of chum salmon fry at a few locations were collected and preserved in 10% formalin for length measurement and stomach analyses. A total of 91 chum salmon fry were retained. On May 25, the stomach contents of two coho (est.1.5-0.8 kg) salmon and three chinook salmon (est. 0.5 kg) from an aquaculture operation near Station 3 were analysed. The fish were sampled from the rearing pen with a dipnet and contents were examined in the field.

LABORATORY METHODS

Chum fry were measured to the nearest millimetre. Stomachs were removed, gut contents weighed, and organisms identified using a Wild M5 Stereomicroscope.

DATA TABULATIONS

Table 2 provides variable descriptions and codes used in the report. A description of species names and codes for fish caught are given in Table 3.

Stomach analysis data are given in Table 6 with an associated list of organism codes in Table 5.

COMMENTS ON RESULTS

1. FISH CATCHES

Fish catch data are tabulated in Table 4. The majority of the salmonids caught were chum salmon fry except at Station 3 (Agamemnon Channel) on May 20 where about 1400 coho salmon (*O. kistuch*) were caught. These were escapees from an adjacent net pen rearing operation and ranged up about 4 kg in weight. A few chinook salmon fry and smolts (*O. tshawytscha*) and sockeye smolts (*O. nerka*) were also taken, with the latter from Agamemnon Channel only. Cutthroat trout (*O. clarkii clarkii*) were only caught in Sechelt Inlet (Stations 9 and 12).

2. CHUM SALMON LENGTH FREQUENCY

Length frequency data for chum salmon fry are shown in Figure 2. More large chum salmon fry (> 90 mm) were caught in Agamemnon Channel relative to Sechelt Inlet. This suggests the former fish originated from rivers in the southern Strait that had grown since leaving their natal streams.

3. STOMACH CONTENTS

None of the coho salmon or chinook salmon examined from the net pen contained macroscopic organisms. Commercial fish food pellets was the only material observed in the stomachs.

Stomach content data for chum salmon fry showed they had been feeding on a wide variety of invertebrates. Twenty-five taxa were observed in the stomachs (Table 6,7).

ACKNOWLEDGEMENTS

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Table 1. Sampling station coordinates and descriptions.

Stn.	Lat. Long.	Geographic Description	Habitat Comments
1	49 45.901 N 124 00.428 W	Nile Pt. Northwest side	Steep shore, boulders Oysters present
2	49 45.927 N 124 00.228 W	Nile Pt, southeast side	Sand/gravel beach
3	49 45.157 N 123 59.352 W	Agamemnon Bay	Gravel beach, creek mouth, oysters present. Fish farm and hatchery.
4	49 45.967 N 124 00.874 W	West side of Agamemnon Channel	Gravel beach, boulders in low intertidal, small creek mouth.
5	49 45.074 N 124 02.252 W	West of Nile Pt on Agamemnon Channel	Rocky beach, boulders in low intertidal, small creek mouth.
6	49 45.200 N 124 00.735 W	Immediately west of ferry slip at Earls Cove	Rocky beach
7	49 45.724 N 124 01.309 W	Southwest side of Agamemnon Channel, Immediately upstream of power lines	Very steep shore
8	49 38.122 N 123 47.442 W	Salmon Inlet, Kunachin Bay	Gravel beach, small creek mouth
9	49 37.969 N 123 47.831 W	Salmon Inlet, Kunachin Bay at Marine Park sign	Gravel beach, small creek mouth
10	49 36.374 N 123 46.775 W	Salmon Inlet, Bible Camp immediately east of Nine Mile Pt	Sand/gravel beach, gentle slope
11	49 36.114 N 123 49.522 W	Sechelt Inlet, west side at Halfway Islets	Eelgrass bed
12	49 32.664 N 123 47.790 W	Sechelt Inlet, mouth of Carlson Creek	Gravel beach, rockweed (*Fucus sp.*); some cobble with barnacles; sedges at high intertidal
13	49 33.038 N 123 45.925 W	Sechelt Inlet, Behind Tuwanek Islets, mouth of Irvine Creek	Gravel beach, boulders in subtidal
14	49 30.569 N 123 45.289 W	Sechelt Inlet, mouth of Angus Creek	Sand beach
15	49 28.894 N 123 45.156 W	End of Sechelt Inlet, Porpoise Bay	Mud/sand beach, sedge

Table 2. Descriptions of the variables and codes in Tables 3 and 4.

Variable Name	Variable Description	Code
DATE	Sampling date (yyyymmdd)	
STATION	Sampling Sites	
SET	Sequential set per site	
TEMP	Surface Temperature (°C)	
	Data not available	-
SAL	Surface Salinity (psu)	
	Data not available	-
TIME	Sampling Time (PDT)	
	Data not available not used	-
SPECIES	Species (defined in Tables)	
	No Catch (NC)	0
	Data not available	-
STAGE	Life history stage	
	Smolt	SM
	Fry	FR
	Juvenile	JU
	Stage not noted	SNN
TOTAL	Catch by species and stage	
	Indicates number estimated	*

Table 3. Scientific and common names and species codes of fishes.

Family/Genus	Scientific Name	Common Name	Code
CLUPEIDAE	*Clupea harengus pallasi*	Pacific Herring	PAHE
SALMONIDAE	Salmonidae	Salmon Unidentified to species	SALM
	Oncorhynchus keta	Chum Salmon	CHUM
	O. nerka	Sockeye Salmon	SOCK
	O. tshawytscha	Chinook Salmon	CHIN
	O. kisutch	Coho Salmon	COHO
	O. clarki clarki	Cutthroat Trout	CUTT
AMMODYTIDAE	*Ammodytes hexapterus*	Pacific Sand Lance	PASL
GASTEROSTEIDAE	*Gasterosteus aculeatus*	Threespine Stickleback	THSK
SYNGNATHIDAE	*Syngnathus griseolineatus*	Bay Pipefish	BAPI
TRICHODONTIDAE	*Trichodon trichodon*	Pacific Sand Fish	PASF
EMBIOTOCIDAE	Embiotocidae	Surfperch Unidentified to species	EMBI
	Embiotoca lateralis	Striped Perch	STPE
	Rhacochilus vacca	Pile Perch	PIPE
	Brachyistius frenatus	Kelp Perch	KEPE
	Cymatogaster aggregata	Shiner Perch	SHPE
GOBIIDAE	Gobiidae	Goby Unidentified to species	GOBI
	Clevelandia ios	Arrow Goby	ARGO
STICHAEIDAE	*Lumpenus sagitta*	Pacific Snake Prickleback	SNPR
PHOLIDAE	Pholidae	Gunnel Unidentified to species	PHOL
	Apodichthys flavidus	Penpoint Gunnel	PEGU
	Pholis ornata	Saddleback Gunnel	SAGU
SCORPAENIDAE	*Sebastes sp.*	Rockfish Unidentified to species	SCOR
	Sebastes maliger	Quillback Rockfish	QURO
HEXAGRAMMIDAE	Hexagrammidae	Unidentified to species	HEXA
	Hexagrammos decagrammus	Kelp Greenling	KEGR
	Hexagrammos stelleri	Whitespotted Greenling	WHGR
	Ophiodon elongatus	Lingcod	LING
COTTIDAE	Cottidae	Unidentified to species	COTT
	Oligocottus maculosus	Tidepool Sculpin	TISC
	Enophrys bison	Buffalo Sculpin	BUSC
	Leptocottus armatus	Pacific Staghorn Sculpin	STSC

Table 3 continued.

Family/Genus	Scientific Name	Common Name	Species Code
BOTHIDAE	*Citharichthys sp.*	Sanddab	SADA
PLEURONECTIDAE	Pleuronectidae	Flatfish Unidentified to species	PLEU
	Platichthys stellatus	Starry Flounder	STAR
	Lepidopsetta bilineata	Rock Sole	ROSO
	Pleuronectes vetulus	English Sole	ENSO
	Pleuronichthys coenosus	CO Sole	COSO

Table 4. Beach seine data from Agamemnon Channel and Sechelt Inlet during 1987.

DATE	STATION	SET	TEMP (°C)	SALINITY (‰)	TIME	SPECIES	STAGE	TOTAL	NOTES
19870520	1	1	-	-	0925	CHUM		116	
19870520	1	1	-	-	0925	SOCK		23	
19870520	1	1	-	-	0925	PASF		2	
19870520	1	2	-	-	0933	CHUM		2	
19870520	1	3	-	-	0943	CHUM		44	
19870520	1	3	-	-	0943	PASF		1	
19870520	1	3	-	-	0943	PASL		1	
19870520	2	1	-	-	0958	CHUM		36	
19870520	2	1	-	-	0958	HEXA		1	
19870520	2	1	-	-	0958	TISC		24	
19870520	2	2	-	-	1010	CHUM		47	
19870520	2	2	-	-	1010	PASL		2	
19870520	3	1	-	-	1045	COHO		53	Escaped smolts from adjacent net pen. All fish > est. 0.5 kg weight.
19870520	3	1	-	-	1045	CHUM		2	
19870520	3	2	-	-	1101	COHO		1466*	Escaped smolts from adjacent net pen. All fish > est. 0.5 kg weight.
19870520	3	3	-	-	1120	NC		0	
19870520	4	1	-	-	1150	NC		0	
19870520	4	2	-	-	1156	CHUM		61	
19870520	4	3	-	-	1205	CHUM		1	
19870520	5	1	-	-	1315	CHIN	SM	1	
19870520	5	1	-	-	1315	CHUM		66	
19870520	5	2	-	-	1340	CHUM		49	
19870520	5	3	-	-	1346	CHUM		69	
19870520	5	3	-	-	1346	PASL		10	
19870520	5	3	-	-	1346	PASF		4	

Table 4 continued.

DATE	STATION	SET	TEMP (°C)	SALINITY (‰)	TIME	SPECIES	STAGE	TOTAL	NOTES
19870520	5	3	-	-	1346	COTT		6	
19870520	5	4	-	-	1400	NC		0	
19870520	5	5	13.5	-	1401	THSK		26	
19870520	5	6	-	-	1410	CHUM		22	
19870520	5	6	-	-	1410	SHPE		13	
19870520	6	1	-	-	1424	CHUM	SM	2	
19870520	6	1	-	-	1424	EMBI		1	
19870520	6	2	-	-	1425	CHIN	SM	1	
19870520	6	2	-	-	1425	CHUM		24	
19870520	6	3	-	-	1440	CHUM		5	
19870520	7	1	-	-	1450	CHUM		6	
19870520	7	1	-	-	1450	EMBI		16	
19870520	7	2	-	-	1458	CHUM		4	
19870520	7	3	-	-	1503	CHUM		1	
19870520	7	3	-	-	1503	EMBI		3	
19870521	8	1	13.7	16.5	0913	CHUM		14	12.4 °C and 26.5 psu at 2m depth
19870521	8	1	-	-	0913	EMBI		20	
19870521	8	1	-	-	0913	SCOR	JU	2	
19870521	8	2	-	-	0925	CHUM		5	
19870521	8	3	-	-	-	CHUM		81	
19870521	8	3	-	-	-	PIPE		1	
19870521	8	3	-	-	-	SHPE		15	
19870521	8	3	-	-	-	EMBI		1	
19870521	9	1	-	-	0945	SHPE		74	
19870521	9	2	13.3	16.5	0958	SHPE		33	

Table 4 continued.

DATE	STATION	SET	TEMP (°C)	SALINITY (‰)	TIME	SPECIES	STAGE	TOTAL	NOTES
19870521	9	2	-	-	0958	BAPI		25	
19870521	9	3	-	-	1010	SHPE		7	
19870521	9	3	-	-	1010	SCOR	JU	4	
19870521	9	3	-	-	1010	BAPI		1	
19870521	10	1	-	-	1028	SHPE		48	
19870521	10	1	-	-	1028	COSO		2	
19870521	10	1	-	-	1028	ROSO		1	
19870521	10	1	-	-	1028	STSC		1	
19870521	10	2	-	-	1038	LING	JU	1	
19870521	10	2	-	-	1038	SADA	JU	1	
19870521	10	2	-	-	1038	SHPE		6	
19870521	10	2	-	-	1038	ENSO	JU	1	
19870521	10	3	-	-	1048	SHPE		3	
19870521	11	1	-	-	1115	CHUM		43	
19870521	11	1	-	-	1115	SHPE		9	
19870521	11	1	-	-	1115	PAHE	JU	200*	
19870521	11	1	-	-	1115	SCOR	JU	3	
19870521	11	1	-	-	1115	PIPE		4	
19870521	11	1	-	-	1115	LING		1	
19870521	11	2	-	-	1123	BUSC		2	
19870521	11	2	-	-	1123	SCOR		1	
19870521	11	2	-	-	1123	LING	JU	1	
19870521	11	3	-	-	1128	SCOR	JU	3	
19870521	11	3	13.4	20.2	1128	LING	JU	1	
19870521	12	1	-	-	1239	SHPE		125*	
19870521	12	1	-	-	1239	CHUM		3	
19870521	12	1	-	-	1239	CUTT		1	Length = 12 cm

Table 4 continued.

DATE	STATION	SET	TEMP (°C)	SALINITY (‰)	TIME	SPECIES	STAGE	TOTAL	NOTES
19870521	12	1	-	-	1239	SADA		2	
19870521	12	1	-	-	1239	COSO	Adult	2	
19870521	12	1	-	-	1239	PHOL		15*	
19870521	12	1	-	-	1239	STSC		2	
19870521	12	2	14.4	21.9	1254	CHUM		1	
19870521	12	2	-	-	1254	STSC		1	
19870521	12	2	-	-	1254	THSK		2	
19870521	12	2	-	-	1254	PHOL	JU	20*	
19870521	12	3	-	-	1310	WHGR		2	
19870521	12	3	-	-	1310	CUTT		1	Length = 15 cm
19870521	12	3	-	-	1310	SHPE		14	
19870521	12	3	-	-	1310	STAR		1	
19870521	12	3	-	-	1310	SADA		1	
19870521	13	1	-	-	1330	NC		0	
19870521	13	2	-	-	1335	CHUM		95	
19870521	13	2	-	-	1335	EMBI		6	
19870521	13	2	-	-	1335	LING	JU	4	
19870521	13	2	-	-	1335	SCOR	JU	3	
19870521	13	3	16.8	17.8	1354	CHUM		26	
19870521	13	3	16.8	17.8	1354	SCOR		1	
19870521	13	3	16.8	17.8	1354	SHPE		18	
19870521	13	3	16.8	17.8	1354	PHOL		1	
19870521	14	1	-	-	1420	CHUM		1	
19870521	14	2	-	-	1428	STAR		50*	mostly JU
19870521	14	2	-	-	1428	STSC		3	
19870521	14	2	-	-	1428	CHUM		1	
19870521	14	3	-	-	1440	CHUM		7	
19870521	14	3	-	-	1440	STAR		4	

Table 4 continued.

DATE	STATION	SET	TEMP (°C)	SALINITY (‰)	TIME	SPECIES	STAGE	TOTAL	NOTES
19870521	14	3	-	-	1440	STSC		1	
19870521	15	1	-	-	1455	CHUM		1	
19870521	15	2	-	-	1500	THSK		10	
19870521	15	2	-	-	1500	STAR	JU	25	
19870521	15	2	-	-	1500	ARGO		1	
19870521	15	2	-	-	1500	STSC	JU	150*	
19870521	15	3	-	-	1508	CHUM		4	
19870521	15	3	-	-	1508	THSK		5	
19870521	15	3	-	-	1508	STSC		1	
19870611	8	1	-	-	1300	NC		0	
19870611	8	2	-	-	1305	NC		0	
19870611	8	3	-	-	1310	CHUM		22	
19870611	9	1	-	-	1340	NC		0	
19870611	9	2	-	-	1345	CUTT		1	Length = 25 cm
19870611	9	3	-	-	1350	NC		0	
19870611	10	1	-	-	1440	NC		0	
19870611	10	2	-	-	1445	NC		0	
19870611	10	3	-	-	1450	NC		0	
19870611	11	1	-	-	1510	CHUM		7	
19870611	11	2	-	-	1520	NC		0	
19870611	11	3	-	-	1537	CHUM		42	
19870611	12	1	-	-	1600	CHUM		24	
19870611	12	2	-	-	1610	CHUM		1	
19870611	12	3	-	-	1615	NC		0	

Table 4 continued.

DATE	STATION	SET	TEMP (°C)	SALINITY (‰)	TIME	SPECIES	STAGE	TOTAL	NOTES
19870611	13	1	-	-	1620	NC		0	
19870611	13	2	-	-	1630	NC		0	
19870611	13	3	-	-	1640	NC		0	
19870611	14	1	-	-	1650	NC		0	
19870611	14	2	-	-	1655	CHUM		1	
19870611	14	3	-	-	1700	NC		0	
19870706	2	1	-	-	1355	PASL		6	
19870706	2	1	-	-	1355	COTT		2	
19870706	2	2	-	-	1410	COTT		1	
19870706	2	2	-	-	1410	SALM		0	
19870706	2	3	-	-	1420	THSK		50	
19870706	2	3	-	-	1420	EMBI	JU	3	
19870706	1	1	-	-	1445	NC		0	
19870706	1	2	-	-	1446	NC		0	
19870706	1	3	-	-	1455	THSK		1	
19870706	1	3	-	-	1455	CHUM		2	
19870706	5	1	-	-	1510	CHUM		1	
19870706	5	1	-	-	1510	THSK		3	
19870706	5	2	-	-	1520	NC		0	Rock caught in seine
19870706	5	3	-	-	1525	COTT		20*	
19870706	5	3	-	-	1525	PASL		1	
19870706	6	1	-	-	1540	CHUM		3	
19870706	6	2	-	-	1550	CHUM		37	
19870706	6	2	-	-	1550	THSK		4	

Table 4 continued.

DATE	STATION	SET	TEMP (°C)	SALINITY (‰)	TIME	SPECIES	STAGE	TOTAL	NOTES
19870706	6	3	-	-	1605	CHUM		23	
19870706	6	3	-	-	1605	THSK		3	
19870706	7	1	-	-	1615	CHIN		1	SNN
19870706	7	1	-	-	1615	THSK		1	
19870706	7	2	-	-	1625	COHO		1	SNN
19870706	7	2	-	-	1625	CHUM		17	
19870706	7	3	-	-	1635	CHIN		2	SNN
19870706	7	3	-	-	1635	CHUM		1	
19870706	7	3	-	-	1635	THSK		15	
19870706	7	3	-	-	1635	EMBI		1	
19870706	4	1	-	-	1650	COHO		1	SNN
19870706	4	1	-	-	1650	SHPE		1	
19870706	4	2	-	-	1655	NC		0	
19870706	4	3	-	-	1710	PASL		4	
19870706	3	1	-	-	1725	PASL		1	
19870706	3	2	-	-	1730	NC		0	
19870706	3	3	-	-	1740	COHO	FR	1	
19870707	8	1	-	-	1000	SHPE		11	
19870707	8	1	-	-	1000	PIPE		7	
19870707	8	1	-	-	1000	QURO		2	
19870707	8	1	-	-	1000	BAPI		2	
19870707	8	1	-	-	1000	COTT		1	
19870707	8	2	-	-	1005	PAHE		4	
19870707	8	2	-	-	1005	QURO		2	
19870707	8	2	-	-	1005	SHPE		2	
19870707	8	2	-	-	1005	PIPE		1	

Table 4 continued.

DATE	STATION	SET	TEMP (°C)	SALINITY (‰)	TIME	SPECIES	STAGE	TOTAL	NOTES
19870707	8	2	-	-	1005	PASL		40	
19870707	8	2	-	-	1005	STPE		1	
19870707	8	2	-	-	1005	SADA		1	
19870707	8	3	-	-	1018	COSO		1	
19870707	8	3	-	-	1018	PIPE		7	
19870707	8	3	-	-	1018	BUSC		1	
19870707	8	3	-	-	1018	BAPI		6	
19870707	8	3	-	-	1018	PASL		26	
19870707	8	3	-	-	1018	COTT		4	
19870707	8	3	-	-	1018	PEGU		2	
19870707	9	1	-	-	1033	GOBI		1	
19870707	9	1	-	-	1033	SHPE		3	
19870707	9	1	-	-	1033	QURO		2	
19870707	9	1	-	-	1033	PIPE		1	
19870707	9	2	-	-	1045	SHPE		57	
19870707	9	2	-	-	1045	PIPE		5	
19870707	9	2	-	-	1045	SAGU		1	
19870707	9	2	-	-	1045	QURO		2	
19870707	9	3	-	-	1100	QURO		7	
19870707	9	3	-	-	1100	SHPE		7	
19870707	9	3	-	-	1100	PIPE		2	
19870707	10	1	-	-	1120	BAPI		5	
19870707	10	1	-	-	1120	SADA		2	
19870707	10	1	-	-	1120	SHPE		260*	
19870707	10	1	-	-	1120	PIPE		1	
19870707	10	1	-	-	1120	QURO		1	
19870707	10	2	-	-	1130	SHPE		4	
19870707	10	2	-	-	1130	BAPI		4	

Table 4 continued.

DATE	STATION	SET	TEMP (°C)	SALINITY (‰)	TIME	SPECIES	STAGE	TOTAL	NOTES
19870707	10	2	-	-	1130	SADA		4	
19870707	10	2	-	-	1130	THSK		1	
19870707	10	3	-	-	1135	SADA		13	
19870707	10	3	-	-	1135	ARGO		2	
19870707	10	3	-	-	1135	COTT		1	
19870707	11	1	-	-	1215	QURO		5	
19870707	11	1	-	-	1215	SHPE		350*	
19870707	11	1	-	-	1215	PIPE		7	
19870707	11	2	-	-	1220	PASL		25	
19870707	11	2	-	-	1220	BUSC		1	
19870707	11	2	-	-	1220	QURO		5	
19870707	11	2	-	-	1220	PIPE		1	
19870707	11	2	-	-	1220	SHPE		3	
19870707	11	3	-	-	1235	PAHE		35	
19870707	11	3	-	-	1235	KEGR		1	
19870707	11	3	-	-	1235	SHPE		6	
19870707	11	3	-	-	1235	PIPE		1	
19870707	11	3	-	-	1235	QURO		4	
19870707	12	1	-	-	1304	QURO		6	
19870707	12	1	-	-	1304	SNPR		1	
19870707	12	1	-	-	1304	SHPE		135	
19870707	12	1	-	-	1304	SAGU		3	
19870707	12	1	-	-	1304	PIPE		7	
19870707	12	1	-	-	1304	STSC		1	
19870707	12	1	-	-	1304	HEXA		1	
19870707	12	1	-	-	1304	PEGU		2	
19870707	12	2	-	-	1315	CHUM		3	
19870707	12	2	-	-	1315	PIPE		9	

Table 4 continued.

DATE	STATION	SET	TEMP (°C)	SALINITY (‰)	TIME	SPECIES	STAGE	TOTAL	NOTES
19870707	12	2	-	-	1315	SHPE		15	
19870707	12	2	-	-	1315	BUSC		2	
19870707	12	2	-	-	1315	SADA		1	
19870707	12	2	-	-	1315	SAGU		4	
19870707	12	2	-	-	1315	PIPE		4	
19870707	12	2	-	-	1315	STSC		4	
19870707	12	2	-	-	1315	ARGO		1	
19870707	12	3	-	-	1325	ARGO		3	
19870707	12	3	-	-	1325	SHPE		10	
19870707	12	3	-	-	1325	COTT		3	
19870707	12	3	-	-	1325	PLEU	JU	1	
19870707	12	3	-	-	1325	BAPI		3	
19870707	12	3	-	-	1325	SADA		1	
19870707	13	1	-	-	1345	SHPE		8	
19870707	13	1	-	-	1345	STPE		2	
19870707	13	2	-	-	1350	SHPE		8	
19870707	13	2	-	-	1350	PIPE		2	
19870707	13	2	-	-	1350	STPE		2	
19870707	13	3	-	-	1400	CHUM		2	
19870707	13	3	-	-	1400	STPE		1	
19870707	13	3	-	-	1400	SHPE		1	
19870707	13	3	-	-	1400	BAPI		1	
19870707	13	3	-	-	1400	COTT		1	

Table 5. Organisms found in stomach content analysis.

GROUP	FAMILY/GENUS	LIFE STAGE	CODE
INSECTA	Insect	Adult	INSA
	Insect	Larvae	INSL
	Insect	Pupae	INSP
COPEPODA	Calanoid		CALN
	Harpacticoid		HARP
BARNACLES	Cirripedia	Adult	CIRA
	Cyprid	Larvae	CIRL
CLADOCERA	Cladocera		CLAD
AMPHIPODA	Gammaridea		GAMM
	Hyperiidea		HYPE
	Caprellidea		CAPR
DECAPODA	Crab	Zoea	BRAZ
	Shrimp	Zoea	DECZ
MYSIDACEA	Mysidacea		MYSI
CUMACEA	Cumacea		CUMA
MOLLUSCA	Clam	Larvae	BIVL
BRYOZOAN	Bryozoan	Larvae	BRYZ
TUNICATE	Tunicata		TUNI
POLYCHAETE	Polychaete		PLCH
MITES	Hydracarina		HYDR
	Mites		
FISH	Fish	Larvae	TLST
DECAPODA	Decapod	Larvae	DECL
MOLLUSCA	Gastropod	Larvae	GASL
EUPHAUSIIDS	Euphausiidea		EUPH
EGGS	Unidentifed Eggs		EGGS

Table 6. Data of chum stomach analysis.

Fish	Site	Date	L (mm)	Wt (g)	Gut Content Weight (g)	% Gut Weight	INSA	INSL	INSP	CALN	HARP	CIRA	CIRL	CLAD	GAMM	HYPE	CAPR	BRAZ	DECZ	MYSI	CUMA	BIVL	BRYZ	TUNI	POLY	HYDR	TLST	DECL	GASL	EUPH	EGGS
1	1	May	75	4.4	0.074	1.69	0	0	0	15	0	0	0	0	0	0	0	9	0	0	0	0	0	0	0	0	0	0	6	0	0
2	1	May	72	3.8	0.124	3.27	4	0	0	0	0	0	0	0	2	0	0	16	0	0	0	0	0	0	0	0	0	0	1	0	0
3	1	May	55	1.6	0.036	2.24	1	0	0	0	2	0	0	0	3	0	0	0	0	0	0	9	320	200	4	0	0	0	1	0	0
4	1	May	50	1.1	0.041	3.69	5	0	0	0	0	0	0	0	4	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0
5	1	May	37	1.6	0.033	2.09	4	0	0	0	8	0	0	0	25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	1	May	49	1.5	0.040	2.69	1	0	0	5	1	0	0	0	1	0	0	1	0	0	0	0	0	25	0	0	0	0	20	0	0
7	1	May	50	1.2	0.064	5.36	3	0	0	3	12	0	0	0	1	0	0	0	0	0	0	4	4	60	0	0	0	0	0	0	0
8	1	May	39	0.6	0.049	8.20	5	0	0	4	9	0	0	0	11	1	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0
9	1	May	54	0.9	0.074	8.20	12	0	0	1	18	0	0	0	62	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10	1	May	47	1.0	0.060	6.00	1	0	0	3	3	0	0	0	48	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11	1	May	41	0.7	0.048	6.81	3	1	0	2	20	0	0	0	45	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12	4	May	45	0.8	0.043	5.35	12	0	0	0	0	0	0	0	4	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13	4	May	59	2.5	0.204	8.14	4	0	0	8	4	0	0	0	0	0	0	0	0	0	0	0	1000	0	0	0	0	0	0	0	0
14	4	May	57	1.8	0.037	2.04	8	0	0	1	4	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	30
15	4	May	49	1.3	0.077	5.90	0	0	0	2	1	0	0	0	0	0	0	0	0	0	0	0	2	12	0	0	0	0	0	0	200
16	4	May	49	1.1	0.040	3.64	4	1	1	0	9	0	0	0	9	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	20
17	4	May	57	1.8	0.049	2.72	1	0	0	6	26	0	0	0	0	2	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
18	4	May	49	1.3	0.105	8.04	1	0	0	1	1	0	0	0	4	0	0	0	0	0	0	30	1000	0	0	0	0	0	0	0	100
19	4	May	48	1.1	0.033	3.03	8	0	0	3	4	0	0	0	1	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	30
20	4	May	48	1.2	0.067	5.59	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	50
21	4	May	47	1.1	0.063	5.75	9	0	0	0	4	0	0	0	4	0	0	0	0	0	0	0	0	6	0	0	0	0	0	0	50
22	4	May	45	0.9	0.052	5.77	19	3	0	1	22	0	0	0	25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
23	6	May	74	3.6	0.020	0.56	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
24	6	May	72	3.5	0.099	2.83	7	0	0	0	0	0	0	0	0	1	16	0	0	0	0	0	0	0	0	0	1	0	5	0	0
25	6	May	77	4.4	0.087	1.98	0	0	0	0	0	0	0	0	0	0	7	1	0	0	0	0	0	0	0	0	0	0	0	0	0
26	6	May	44	0.8	0.030	3.79	1	0	1	0	1	0	0	0	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
27	6	May	66	2.8	0.007	0.25	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0
28	6	May	56	1.6	0.061	3.83	0	2	0	2	12	0	0	0	0	0	6	0	0	0	0	0	100	0	0	0	2	0	0	0	0
29	6	May	52	1.1	0.037	3.38	1	0	0	0	2	0	0	0	0	0	18	0	0	0	0	0	0	4	0	0	0	0	0	0	0
30	6	May	56	1.6	0.041	2.57	0	0	0	2	2	0	0	0	0	3	0	0	0	0	0	0	0	25	0	0	0	0	7	0	0
31	6	May	62	2.4	0.089	3.70	13	0	0	0	7	0	0	0	3	1	19	0	0	0	0	1	200	0	0	0	0	0	1	0	0
32	6	May	68	3.1	0.046	1.48	0	0	0	3	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0
33	6	May	67	2.8	0.198	7.07	0	0	0	27	200	0	0	0	0	0	0	0	0	0	0	7	0	0	0	0	1	0	1	0	0
34	6	May	63	2.3	0.010	0.43	0	0	0	0	0	0	0	0	0	0	11	0	0	0	0	4	0	3	0	0	0	0	0	0	0
35	6	May	83	5.5	0.172	3.13	0	0	0	3	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Table 6 continued.

Fish	Site	Date	L (mm)	Wt (g)	Gut Content Weight (g)	% Gut Weight	INSA	INSL	INSP	CALN	HARP	CIRA	CIRL	CLAD	GAMM	HYPE	CAPR	BRAZ	DECZ	MYSI	CUMA	BIVL	BRYZ	TUNI	POLY	HYDR	TLST	DECL	GASL	EUPH	EGGS
36	6	May	90	7.3	0.156	2.13	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0
37	8	May	37	0.4	0.007	1.63	5	0	0	0	1	0	0	0	3	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
38	8	May	37	0.5	0.012	2.36	5	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
39	8	May	34	0.3	0.004	1.20	1	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
40	8	May	38	0.5	0.009	1.78	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
41	8	May	48	0.9	0.025	2.72	18	0	0	0	8	0	0	0	2	0	0	0	0	0	0	60	0	0	0	0	0	0	0	0	0	0
42	8	May	38	0.5	0.020	4.06	3	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
43	8	May	37	0.5	0.003	0.66	9	0	1	0	11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
44	8	May	48	1.0	0.027	2.66	37	0	2	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
45	8	May	38	0.6	0.020	3.33	27	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
46	8	May	43	0.8	0.034	4.26	26	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
47	11	May	75	4.4	0.007	0.15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	11	0	0	0	0	0	0	0	6
48	11	May	84	6.9	0.056	0.80	12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
49	11	May	66	3.1	0.023	0.73	2	0	0	2	18	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	6
50	11	May	79	5.4	0.045	0.83	10	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
51	11	May	78	4.9	0.008	0.17	12	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	2	0	0	0	0	0	0	0	0
52	13	May	54	1.7	0.066	3.88	34	0	0	1	0	0	0	0	1	3	0	0	0	0	0	6	0	0	0	0	0	0	0	0	0	0
53	13	May	44	0.9	0.027	3.02	15	1	0	4	0	0	0	0	0	3	0	0	0	0	0	12	0	0	0	0	2	0	0	0	3	0
54	13	May	51	1.3	0.034	2.62	29	0	0	1	0	0	3	0	0	2	0	0	0	0	0	100	0	0	0	0	0	0	0	0	0	0
55	13	May	38	0.5	0.018	3.50	20	0	0	2	8	0	0	0	2	2	0	0	0	0	0	20	0	0	0	0	0	0	0	0	0	0
56	13	May	46	1.0	0.028	2.78	17	1	0	1	2	0	0	0	0	0	0	0	0	0	0	9	0	3	0	0	0	0	0	0	0	0
57	13	May	53	1.6	0.045	2.79	18	0	0	3	1	0	3	0	0	8	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0
58	13	May	47	1.2	0.022	1.83	4	0	0	0	0	0	1	0	0	0	0	0	0	0	0	200	0	0	0	1	0	0	0	0	0	0
59	13	May	54	1.5	0.057	3.79	25	0	0	2	3	0	2	0	0	28	0	0	0	0	0	300		0	0	0	8	0	0	0	0	0
60	13	May	50	1.4	0.050	3.57	22	0	0	1	6	0	3	0	0	2	0	0	0	0	0	300	0	0	0	0	0	0	0	0	0	0
61	13	May	53	1.7	0.011	0.62	13	0	0	0	0	0	0	0	0	0	3	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0
62	15	May	50	1.1	0.063	5.74	7	0	0	0	3	0	1	500	2	0	0	1	0	0	0	2	1	0	0	0	1	0	0	0	0	0
63	15	May	45	1.0	0.059	5.86	0	3	0	1	0	0	1	200	2	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0
64	15	May	48	1.0	0.029	2.86	4	0	0	0	0	0	0	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
65	15	May	46	1.0	0.064	6.43	5	1	0	0	2	0	1	100	3	0	0	1	0	0	0	0	0	0	0	0	20	0	0	0	0	0
66	8	Jun	77	5.0	0.112	2.23	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	300	0
67	8	Jun	86	6.4	0.309	4.83	2	0	0	1	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	1	0	0	1000	0
68	8	Jun	83	6.3	0.277	4.40	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	900	0
69	8	Jun	80	5.5	0.331	6.02	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1100	0

Table 6 continued.

Fish	Site	Date	L (mm)	Wt (g)	Gut Content Weight (g)	% Gut Weight	INSA	INSL	INSP	CALN	HARP	CIRA	CIRL	CLAD	GAMM	HYPE	CAPR	BRAZ	DECZ	MYSI	CUMA	BIVL	BRYZ	TUNI	POLY	HYDR	TLST	DECL	GASL	EUPH	EGGS
70	8	Jun	84	6.1	0.022	0.37	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	20	0
71	8	Jun	89	7.6	0.191	2.51	0	0	0	0	0	0	0	0	0	12	0	0	0	0	0	0	0	0	0	0	0	0	0	300	0
72	8	Jun	67	3.1	0.165	5.31	12	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	200	0
73	8	Jun	70	3.4	0.214	6.28	0	0	0	12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	300	0
74	8	Jun	55	1.7	0.023	1.33	6	0	0	5	4	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	7	0
75	8	Jun	74	3.9	0.006	0.15	0	0	0	4	30	0	0	9	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	4	0
76	2	Jul	77	4.5	0.053	1.17	13	0	0	1	0	0	0	0	1	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
77	2	Jul	60	1.9	0.031	1.61	5	2	1	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0
78	2	Jul	86	6.3	0.026	0.41	2	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
79	2	Jul	79	5.0	0.022	0.44	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
80	2	Jul	94	8.8	0.094	1.07	3	0	0	0	0	11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81	6	Jul	153	47.6	1.953	4.10	0	0	0	0	0	0	0	0	2	12	0	0	0	0	0	0	0	0	0	0	0	0	0	11	0
82	6	Jul	127	25.0	0.222	0.89	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
83	7	Jul	110	14.4	0.283	1.96	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0
84	7	Jul	98	10.2	0.014	0.14	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
85	7	Jul	90	6.9	0.079	1.15	27	0	0	1	0	4	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
86	7	Jul	101	11.5	0.089	0.77	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0
87	7	Jul	109	14.3	0.553	3.86	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
88	12	Jul	89	7.8	0.166	2.12	0	0	0	93	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
89	12	Jul	85	6.1	0.098	1.61	6	0	0	17	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
90	12	Jul	110	15.4	0.102	0.66	0	0	0	6	0	1	0	0	0	0	0	17	1	4	0	0	0	0	0	0	0	0	0	0	0
91	12	Jul	90	8.0	0.182	2.27	18	0	0	23	0	2	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0

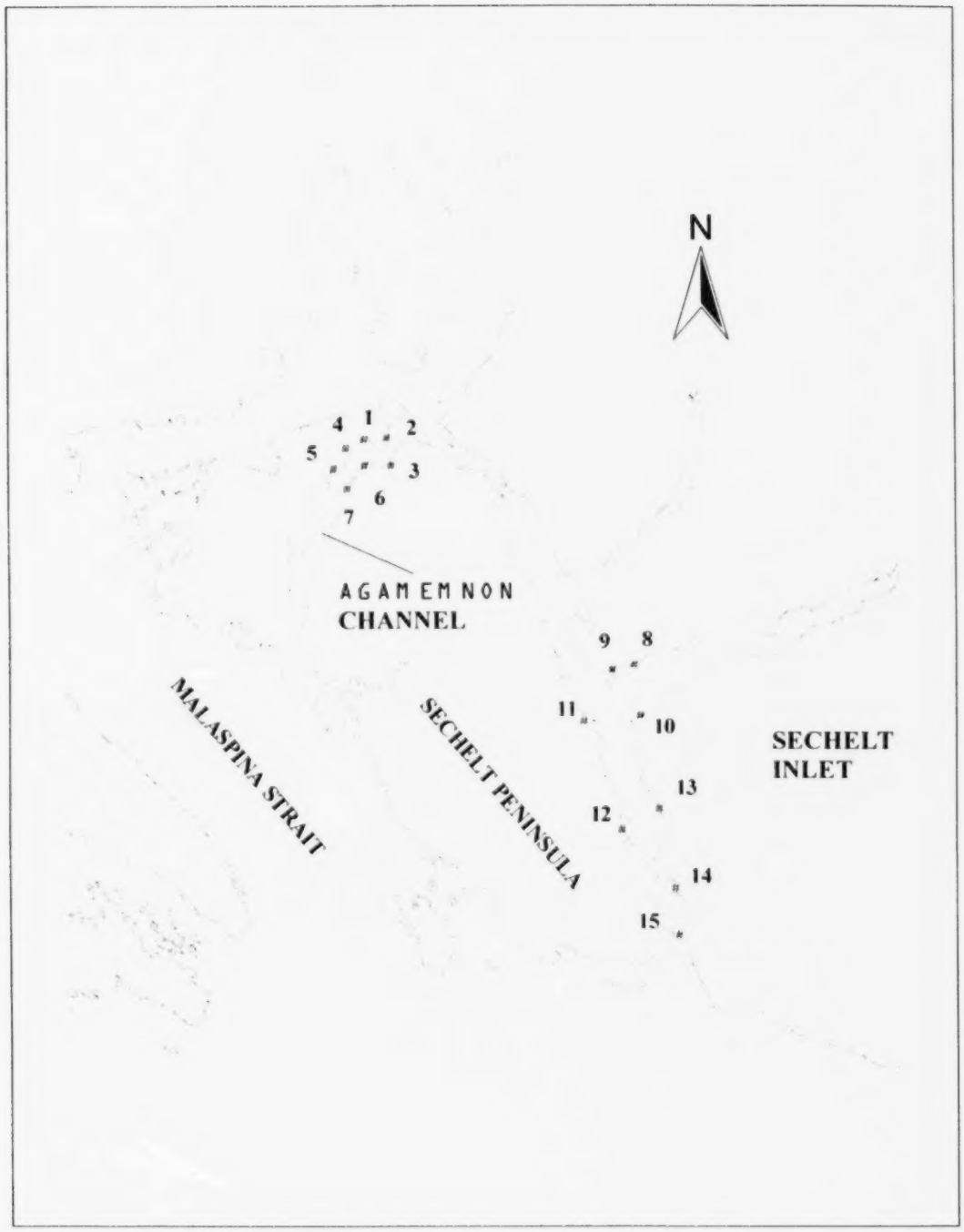

Figure 1. Location of beach seine sampling sites in Agamemnon Channel and Sechelt Inlet. Refer to Table 1 for site descriptions.

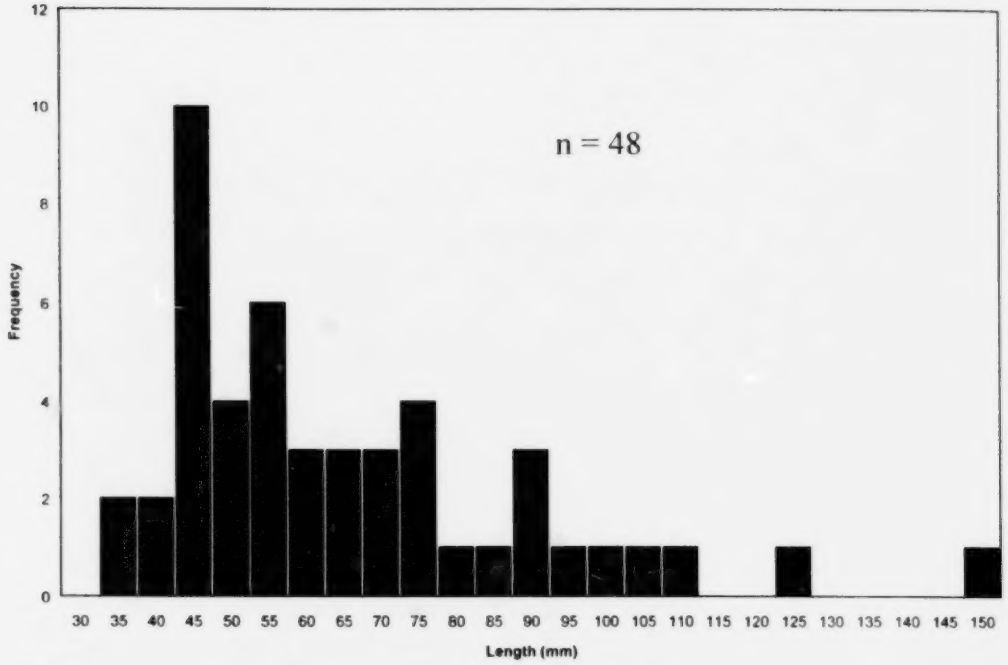

Figure 2a. Length frequency data for chum salmon fry caught in Agamemnon Channel (data for May and July combined, n=48).

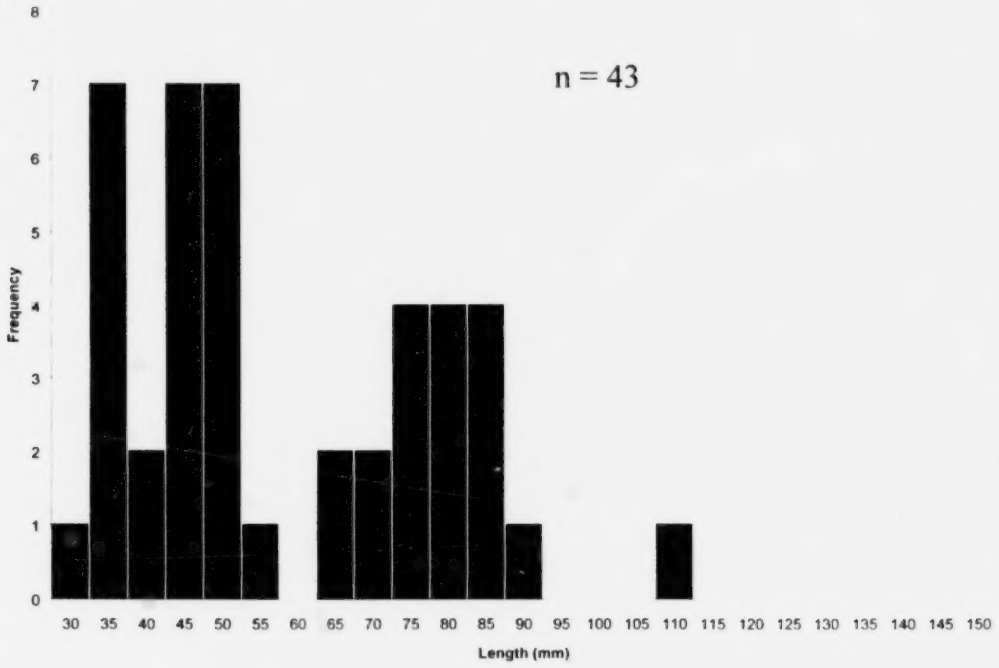

Figure 2b. Length frequency data for chum salmon fry caught in Sechelt Inlet (data for May, June and July combined, n=43).